L 42123-66

ACC NR: AP6024453 /

level $E_c - 0.09$ ev belongs to the association of the oxygen atom with a point-contact defect, the association appears only as a result of irradiation at room temperature, and it is analogous to the A-center in silicon. Germanium of the n-type, alloyed with oxygen to a concentration of $5 \cdot 10^{17}$ cm^{-3}, proved to be more radiation stable than n-type material with the same resistivity, but with a considerably lower oxygen concentration. Specimens of n-type Ge with an oxygen concentration of $\sim 5 \cdot 10^{17}$ cm^{-3} do not change their type of conductivity upon irradiation by a flux up to $6 \cdot 10^{18}$ cm^{-2}, and the lifetime starts to decrease only after irradiation with a flux on the order of 10^{18} cm^{-2}. The authors express their deep gratitude to M. D. Tyapkina for providing the oxygen-alloyed crystal. Orig. art. has: 4 figures.   . [26]

SUB CODE: 20/ SUBM DATE: 02Aug65/ ORIG REF: 002/ OTH REF: 003/ ATD PRESS: 5063

Card 2/2

AUTHOR: Vavilov, V. S.; Nakhodnova, I. A.; Silin', A. R.; Yunovich, A. E.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Radiative recombination of GaSb p-n junctions obtained by crystal pulling from a melt

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2330-2335

TOPIC TAGS: gallium antimonide, single crystal growing, recombination spectrum, crystal donor, crystal impurity, p n junction

ABSTRACT: P-n junctions in single crystals of GaSb were obtained by growing a crystal on a seed containing a donor (Te) (or acceptor) impurity from a melt alloyed with an acceptor (Zn, Cd) (or respectively donor) impurity. The crystals were grown in a hydrogen atmosphere. The seeds were oriented along the direction $\langle 111 \rangle$. Primary attention is devoted to the dependence of the radiative recombination spectra on the concentration of impurities in the area of the p-n junction and on the injection level. In particular, low excitation levels (current density of about 1 a/cm^2) were investigated. The dependence of energy at the emission spectral peak on the voltage across the p-n junction was observed at small currents and large concen-

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L 45327-66
ACC NR: AP6026678

trations of impurities. This dependence is apparently due to the tunnel effect, including electron transitions to the "tail" of the density curve of the states of the conduction band. Orig. art. has: 5 figures.

SUB CODE: 20/ SUBM DATE: 27Dec65/ ORIG REF: 004/ OTH REF: 009

Card 2/2

L 01051-67 FWT(1)/EWT(m)/FWP(t)/ETI   IJP(c)   JD/GG
ACC NR: AP6030957   SOURCE CODE: UR/0181/66/008/009/2598/2604   90
83
B

AUTHOR: Vavilov, V. S.; Plotnikov, A. F.; Sokolova, A. A.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Oscillating photoconductivity of cadmium telluride and its connection with exciton absorption

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2598-2604

TOPIC TAGS: photoconductivity, cadmium telluride, exciton, exciton absorption, absorption spectrum, absorption coefficient, heat of dissociation, impurity center

ABSTRACT: The spectra of photoconductivity, optical absorption, and reflection of CdTe crystals near the basic absorption band have been obtained at 80 and 15K. A thin structure of photoconductivity spectra is detected. It is established that the dependence of the absorption coefficient on photon energy is nonmonotonic. The peak reflection in the photon energy region close to 1.58 ev is noted at 80K. The absorption and reflection observed are interpreted to be of the exciton type. The structure of photoconductivity spectra is related to the development of excitons and

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L 01051-67

ACC NR: AP6030957

7

their heat of dissociation with the participation of impurity centers. The authors thank B. M. Vul, L. V. Keldysh, N. A. Penin, and E. L. Nolle for their valuable remarks and criticism of the work, S. A. Medvedev and S. N. Maksimovskiy for furnishing the samples, and N. N. Borzunov for his considerable assistance in preparing them for the experiments. Orig. art. has: 4 figures. [Based on authors' abstract]

[NT]

SUB CODE: 20/ SUBM DATE: 14Jan66/ ORIG REF: 003/ OTH REF: 014/

awm

Card 2/2

L 01821-67   EWT(m)/T/EWP(t)/ETI   IJP(c)   JD

ACC NR: AP6030964   SOURCE CODE: UR/0181/66/008/009/2660/2663

AUTHOR: Vavilov, V. S.; Stopachinskiy, V. B.; Chanbarisov, V. Sh.

ORG: Physics Institute im. P. N. Lebedev AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Oscillations in cadmium sulfide optical absorption arising in strong electrical fields

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2660-2663

TOPIC TAGS: optical absorption, absorption coefficient, cadmium, cadmium sulfide

ABSTRACT: A study of CdS monocrystals ($\sim 10-20 \mu$ in thickness), at the temperature of liquid nitrogen, reveals an oscillating component arising in a strong electric field, which is in spectral dependence on the coefficient of absorption. The period of oscillations T was found to be equal to $\frac{2\pi\hbar}{eEd}$ (where E is field intensity and d is the lattice constant in the direction of the field). If the scattering of carriers is taken into account, difficulties are encountered in explaining this phenomenon in

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L 01521-67

ACC NR: AP6030964   3

terms of a transition between discrete Wannier levels. The authors thank B. M. Vul. L. K. Keldysh, and Yu. A. Kurskiy for discussing the findings obtained. Orig. art. has: 4 figures. [Based on authors' abstract]   [SP]

SUB CODE: 20/ SUBM DATE: 31Jan66/ ORIG REF: 004/ OTH REF: 014/

Card 2/2   fv

ENO(m)/EWP(k)

L 2982-66   EWA(k)/FED/EWT(1)/EWT(m)/EEC(k)-2/ETC/T/EWP(t)/EWP(b)/EWA(m)-2/EWA(h)

ACCESSION NR: AP5023360   SCTB/LJP(c)   WG/RLM/JD   UR/0020/65/164/001/0073/0074

AUTHOR: Vavilov, V. S.; Nolle, E. L.

TITLE: Cadmium telluride electron-beam pumped CdTe laser

SOURCE: AN SSSR. Doklady, v. 164, no. 1, 1965, 73-74

TOPIC TAGS: laser, semiconductor laser, CdTe, electron beam laser, recombination radiation

ABSTRACT: The authors report attaining laser action in CdTe pumped by a beam of electrons. A sample 0.4 x 0.4 x 0.4 mm was cleaved from n-type CdTe with a hole concentration of 10^{14} cm^{-3} at room temperature. The polished front face of the sample was perpendicular to the two polished faces forming the cavity. The sample was attached to the cold finger of a cryostat maintained at 10—15K. The beam of 150-kev electrons was incident on the front face of the sample. The beam current was supplied in 0.4-μsec pulses at a rate of 10 pulses per second. The short-wavelength radiation emitted perpendicular to the polished faces forming the cavity was shifted 20—30 Å toward the longer wavelengths, as compared with radiaticn emitted from the front face exposed to the electron beam. When the current density was increased from 0.3 to 1 amp/cm^2, the intensity of emission increased

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L 2982-66

ACCESSION NR: AP5023360   3

by approximately two orders of magnitude (see Fig. 1 of Enclosure). Simultaneously,
the width at half maximum decreased from 25 Å to approximately 3 Å (Fig. 2). At
a current density of 1 amp/cm^2 the divergence in the horizontal plane perpendicular
to the front face was about 15°. At an input power of the exciting electrons equal
to 300 w, the output power within a solid angle of 15° was not less than 0.3 w.
The narrowing of the spectral line to a value less than kT, a sharp increase in
intensity, and the appearance of directionality at a current density of 1 amp/cm^2
indicated the onset of stimulated emission. The stimulated emission was attributed
to exciton transitions.   Orig. art. has: 2 figures.   [CS]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics
Institute, Academy of Sciences SSSR)

SUBMITTED: 25Jan65   ENCL: 02   SUB CODE: EC

NO REF SOV: 008   OTHER: 002   ATD PRESS: 4109
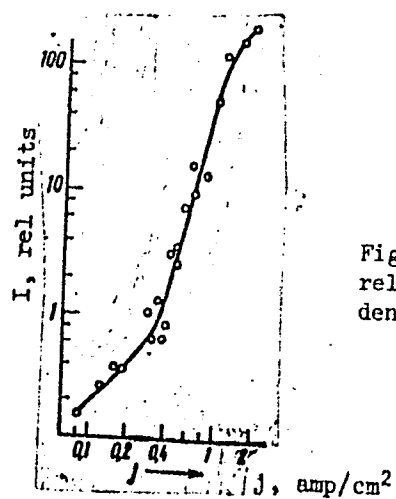
Card 2/4

L 2982-65

ENCLOSURE:. 01

Fig. 1. The intensity of emission I (in relative units) as a function of current density j
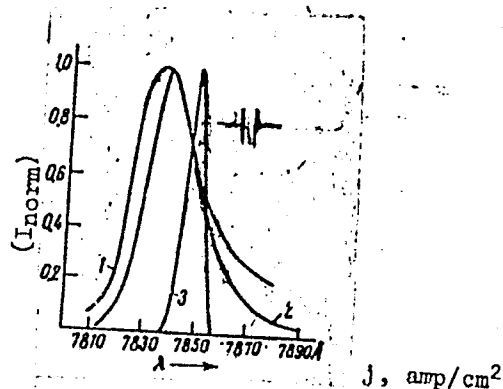
Card   3/4

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ACCESSION NR: AP5023360

Fig. 2. Variation of the linewidth with the current density

1 - j = 0.3 amp/cm^2; 2 - j = 0.54 amp/cm^2;
3 - j = 1.1 amp/cm^2.

BVK

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L 17404-66   EWT(1)/EWT(m)/EWP(e)/T   LJP(c)   WH

ACC NR: AP6003751   SOURCE CODE: UR/0181/66/008/001/0003/0008

AUTHOR: Konorova, Ye. A.; Kozlov, S. F.; Vavilov, V. S.

ORG: Physics Institute im. P.N. Lebedev, AN SSSR, Moscow (Fizicheskiy Institut AN SSSR)

TITLE: Ionization currents in diamond during irradiation by electrons with energies from 500 to 1,000 kev

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 3-8

TOPIC TAGS: diamond, ionization counter, impact ionization, electron bombardment

ABSTRACT: Earlier investigations have failed to supply unambiguous conclusions concerning the counting mechanism of diamonds. It is essential to establish the effectiveness of high electrical fields and to estimate the lifetime of carriers in natural Soviet diamonds. Consequently, using an electrostatic accelerator supplying 10^{-6} to 10^{-5}-sec-long single and periodic electron pulses (rise time 10^{-7} sec), the present authors showed that with fields above 10^3 V/cm there is a departure from linearity in the relationship between the product of the drift velocities and the carrier lifetime, and the magnitude of the field (see Fig. 1). The interpretation of the results is based on the theoretical results of A.G. Redfield (Phys. Rev., 94, 526, 1954) and B.I. Davydov and N.M. Shmushkevich (UFN, 24, card 1/3
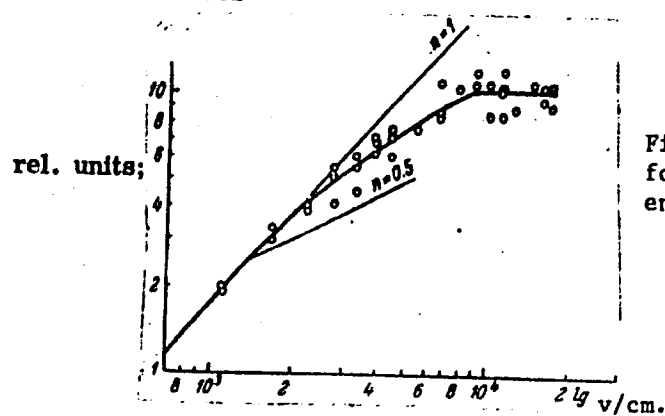
L 17404-66

ACC NR: AP6003751

Fig. 1. Volt-ampere characteristics for one of the samples with electron energies at 500 kev

19, 1939). The quantitative results are in fair agreement with the theory. It is shown that the lifetime of electrons in natural diamond is 10^{-10} to 10^{-8} sec, and for nitrogen concentration above 10^{19} cm^{-3} the lifetime is determined by the N content. Nitrogen concentration was determined by the absorption coefficient of the 7.8μ wavelength. However,

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L 17404-66
ACC NR: AP6003751

it is still unclear why the carrier lifetime appears independent of the field (i. e.. of the speed). "The authors thank V. A. Chuyenkov for his comments in the discussion and S. I. Vintovkin for his help in the measurements." Orig. art. has: 1 formula, 5 figures, and 2 tables.   [08]

SUB CODE: 20 /SUBM DATE: 26May65 / ORIG REF: 002 / OTH REF: 007 / ATD PRESS:
18/   4206

Card 3/3

L-20491-66 EWT(m)/ETC(f)/EWG(m)/EWP(t) IJP(o) RDW/JD

ACC NR: AP6003819   SOURCE CODE: UR/0181/66/008/001/0286/0287

AUTHOR: Nolle, E. L.; Vavilov, V. S.; Golubev, G. P.; Mashtakov, V. S.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Induced radiation of cadmium selenide due to electron excitation

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 286-287

TOPIC TAGS: light radiation, radiation intensity, light emission, light excitation

ABSTRACT: An attempt was made to obtain stimulated emission of light from calcium selenide excited with electron pulses. A specimen having the form of a rectangle parallelepiped 600 x 400 x 50 μ was used for observation of the emission. The electron beam was incident on the largest surface of the specimen, while the emission was recorded from the specimen's side faces, the distance between which was 600 μ. The measurements were made at 80K. The observation of emission from the side faces showed that the maximum of the spectral band is shifted by 35 Å to the longwave side as compared with emission recorded from the forward face irradiated with electrons. When current density was increased from 1 amp/cm^2, a sharp increase in emission intensity was observed along with the simultaneous appearance of the directional effect of emission and a decrease of the width at the half-height of the band from 80 to 15 Å. At a current density of 2.5 amp/cm^2, the emission spectrum has an equidistant struc-

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L 20491-66

ACC NR: AP6003819

ture in the form of separate stages located 2.6 Å from each other. These stages apparently are associated with the resonator modes. The maximum of emission was at $\lambda = 6950$ Å. The angle between the directions corresponding to the values of emission intensity equal to one-half of the maximum value was 17° at a current density of 2.5 amp/cm^2. These data indicate that generation of stimulated emission occurs in cadmium selenide. Orig. art. has: 2 figures. [JA]

SUB CODE: 20/ SUBM DATE: 11Aug65/ ORIG REF: 003/ OTH REF: 001/ ATD PRESS: 4215

Card 2/2

L 21477-66   EWT(1)/EWT(m)/EWG(m)/EWP(t)   IJP(c)   RDW/JD/AT

ACC NR: AP6006842   SOURCE CODE: UR/0181/66/008/002/0532/0540

AUTHOR: Vavilov, V. S.; Nolle, E. L.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Spontaneous and stimulated emission of recombination radiation of CdTe due to electron excitation

SOURCE: Fizika tverdogo tela, v. 8, no. 2, 1966, 532-540

TOPIC TAGS: recombination radiation, recombination emission, single crystal

ABSTRACT: An investigation was made of the emission of recombination radiation by nonalloyed single CdTe crystals due to excitation by 150-kev electrons. An electron tube with a constant high voltage which generated 150-kev electron pulses with a duration time from 0.25 to 10 μsec was used. A beam of electrons was focused on a spot 1 mm in diameter, where the current density reached 3 amp/cm^2. The free path of 150-kev electrons in CdTe was about 40 μ. The emission spectrum of CdTe due to electron excitation consisted basically of four bands with photon energies close to 1, 1.4, 1.55, and 1.59 ev at T = 10K. It was possible that the emission bands at 1 and 1.55 ev in CdTe not

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L 21477-66

ACC NR: AP6006842   /

alloyed with impurities were associated with recombination through single- and double-charged acceptor vacancies of cadmium, whose energy levels are $E_v + 0.05$ and $E_c - 0.6$ ev, respectively. The emission band at 1.47 ev could be associated with recombination through foreign impurities. The intensity of the shortwave   band increased exponentially with the temperature decrease $I \sim T^{-n}$, where $n = 0.5$—1.5, thus indicating the absence of a thermal barrier. The intensity of the band also increased with the excitation level according tb the square law. At high excitation levels the intensity dependence changed into a linear one in the case of the _highest-purity_ CdTe specimens, thus indicating the predominance of radiation emission recombination. Apparently, the shortwave emission band was linked with the annihila-tion of excitons. A direct coherent stimulated radiation emission of CdTe was observed in a region corresponding to the annihilation of excitons at a current density exceeding 0.3 amp/cm² for 10K and 1 amp/cm² for 80K. Orig. art. has: 1 formula and 8 figures.   [JA]

SUB CODE: 20/ SUBM DATE: 11May65/ ORIG REF: 011/ OTH REF: 010
ATD PRESS: 4218

Card 2/2 dea

ACC NR: AP6015490   (N)   SOURCE CODE: UR/0181/66/008/005/1608/1612

AUTHOR: Angelova, L. A.; Vavilov, V. S.; Yunovich, A. E.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Radiative recombination in GaP during excitation by electric current and by electron beam

SOURCE: Fizika tverdogo tela, v. 8, no. 5, 1966, 1608-1612

TOPIC TAGS: gallium base alloy, semiconductor research, radiative recombination, gallium arsenide

ABSTRACT: Single crystals of GaP grown non-stoichiometrically with an electron concentration of $1 \cdot 10^{16}$ cm^{-3} and a mobility of 126 $cm^2/v \cdot sec$ were excited by a 75 kev electron beam. The spectra of these non-alloyed n-type crystals were recorded by a ZMR-3 spectrograph and a FEU-28 photomultiplier. Radiative recombination at 77 and 15°K was investigated in the current density range $7 \cdot 10^{-3} < j < 6$ a/cm^{-2}. The excitation level was $2 \cdot 10^{23}$ sec^{-1} $cm^{-3} < g < 2 \cdot 10^{26}$ $cm^{-3} \cdot sec^{-1}$. Within the limits of the measurement errors, the obtained phonon energy values coincided with data obtained by other researchers, e. g., $LO = 0.049 \pm 0.002$ ev, $AC = 0.014 \pm 0.002$ ev. Specimens of GaP obtained by epitaxial growing of GaP and GaAs with an electron concentration of $1.7 \cdot 10^{18}$

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L 06304-67

ACC NR: AP6015490

and $3.5 \cdot 10^{15}$ cm^{-3} were also examined at 77°K. In the 5500-9500 Å range, a broad spec-trum with a maximum at 7200-7300 Å was obtained. Compared to the material obtained from the melt, the radiative intensity of epitaxially grown GaP was smaller by approximately two orders of magnitude. Data obtained from a microscopic analysis of luminescent diodes prepared from alloyed GaP showed that the life span of holes injected in the n-range is $2 \cdot 10^{-7}$ sec. The work on electron excitation of GaP was carried out in the Laboratory of Semiconductors of FIAN. The authors thank G. P. Golubev, V. S. Mashtakov and E. L. Nol'le of the laboratory for assisting in the work. The authors also thank A. Ya. Nashel'skiy, V. P. Maslov and A. V. Lishina for making the specimens available and G. N. Galkin for his assistance in the work. Orig. art. has: 2 figures.

SUB CODE: 20/   SUBM DATE: 11Nov65/   ORIG REF: 002/   OTH REF: 004

Card 2/2

ACC NR: AP6036995   (A,N)   SOURCE CODE: UR/0181/66/008/011/3390/3391

AUTHOR: Vavilov, V. S.; Plotnikov, A. F.; Selezneva, M. A. Sokolova, A. A.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Dependence of charge carrier mobility on temperature in GaAs crystals irradiated with fast electrons

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3390-3391

TOPIC TAGS: carrier scattering, current carrier, irradiation, ionizing irradiation, irradiation effect

ABSTRACT: An investigation was made of the effect of radiation defects in the crystal structure of GaAs on the scattering character of the charge carriers at different temperatures. Four pure specimens, in which the mobility of charge carriers at temperatures from 100 to 300K was due mainly to the scattering on optical lattice vibrations, were irradiated with a gradually increasing flux of electrons with an energy of about 1 Mev at room temperature. In pure GaAs crystals at temperatures higher than 300K, the mobility is due primarily to the scattering on polar optical lattice vibrations. At temperatures lower than 100K, scattering on ionized impurities prevails. In the temperature range from 100 to

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ACC NR: AP6036995

300K, both types of scattering take place, although with an increase in impurity concentration the scattering on ionized impurities becomes more substantial. In irradiated crystals the mobility was due to scattering of charge carriers on simple point defects. The calculated number of displaced atoms due to irradiation coincided with the number of scattering centers determined experimentally. This proves that structure defects affecting the scattering character in GaAs crystals irradiated with electrons are really Frenkel defects. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 20May66/ OTH REF: 007/ ATD PRESS: 5107

Card 2/2

ACC NR: AP6026687   SOURCE CODE: UR/0181/66/008/008/2374/2381

AUTHOR: Kurova, I. A.; Vrana, M.; Vavilov, V. S.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Observation of the motion of electrical domains in n-type germanium with a partially compensated upper acceptor level of gold

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2374-2381

TOPIC TAGS: electron capture, electron donor, temperature dependence, electric field

ABSTRACT: The motion and velocity of a strong electrical field (domain) was observed in samples of germanium containing Au and Sb in the range of temperatures between 15 and 35°K. The electrical instability is due to the dependence of electron capture in the upper acceptor level of the gold (E_c = 0.04 ev) on the magnitude of the electric field. When the temperature and background increase, the domain accelerates. In the region of thermal generation of electrons in the sample, velocity depends exponentially on temperature and the activation energy is ~0.04 ev. In the region in which electrons are generated primarily by the thermal background from the gold acceptor level, the temperature dependence of the velocity is exponential for all values of the background, and the activation energy is ~0.016 ev, which is close to the temperature de-

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ACC NR: AP0028637

pendence of the coefficient of electron capture on doubly negative charged gold atoms at these temperatures. At lower temperatures, domain motion depends but slightly on temperature, and agrees with the theoretical equation of B. K. Ridley (*Phys. Let.*, 16, 105, 1965). The voltampere characteristic is linear and there is no instability below 15°K because conductivity in the samples is governed primarily by the ionization of carriers from the shallow donor level, which is filled by electrons as a result of optical recharging. It is shown that inhomogeneities in the sample strongly affect the nature of domain motion. The domain forms in the region of the largest stationary field in the sample and travels toward the field, disappearing at the anode or in the region of the weak field ahead of the anode. The authors thank V. L. Bonch-Bruyevich for discussions and V. V. Ostroborodova and N. I. Danilova for preparing the crystal samples. Orig. art. has: 10 figures.

SUB CODE: 20/   SUBM DATE: 10Jan66/   ORIG REF: 006/   OTH REF: 008

Card 2/2

ACC NR: AP5020090   SOURCE CODE: UR/0181/66/008/008/2395/2400

AUTHOR: Vavilov, V. S.; Koval', Yu. P.; Koshelev, O. G.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy univer-
sitet)

TITLE: Effect of illumination on the electronic spin-lattice relaxation of phospho-
rous and A-centers in silicon

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2395-2400

TOPIC TAGS: spin lattice relaxation, EPR, photon, electron spin, impurity center

ABSTRACT: Two impurity centers, neutral phosphorous and negatively-charged A-centers,
are investigated at 1.9°K by the EPR method. The crystals studied contained both cen-
ters ionized by light of the same spectral composition. The spin-lattice relaxation
rate of both impurities was found to increase by a factor of 10 under the effect of the
light, owing to electron transitions into the conductivity band. Measurements were made
of the rate at which equilibrium amplitudes of the spectral lines are restored as de-
pendent on the experimental conditions after electron spin flip. The rates at which
the electrons are raised to the conductivity band by the two centers are determined.
The photon absorption cross section, averaged for the energies of 0.4 to 0.6 ev, is
about 10 times greater for phosphorous than for A-centers. The methodology used is de-

Card 1/2

ACC NR: AP5026890

scribed and the results obtained are discussed in detail. The authors thank S. I. Vin-
tovkin for the irradiated samples used in the study. Orig. art. has: 4 figures, 1
table, 3 formulas.

SUB CODE: 20/   SUBM DATE: 22Jan66/   OTH REF: 007

Card 2/2

ACC NR: AP6037024   (A,N)   SOURCE CODE: UR/0181/66/0C /011/3449/3450

AUTHOR: Vavilov, V. S.; Koshelev, O. G.; Koval', Yu. P.; Klyava, Ya. G.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Investigation of the inter-impurity recombination between phosphorus and boron in silicon

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3449-3450

TOPIC TAGS: silicon semiconductor, radiative recombination, epr spectrum, temperature dependence, impurity conductivity, activation energy

ABSTRACT: In view of lack of data on the temperature dependence of inter-impurity recombination, the authors used electron paramagnetic resonance to study this recombination in silicon at temperatures 4.2K and below. The procedure used was that developed by A. Honig and R. Enck (Proceedings of Symposium on Radiative Recombination in Semiconductors, Paris, July, 1964). The investigations were made on two samples containing different phosphorus and boron concentrations. To disturb the equilibrium in the distribution of the electrons between the boron and the phosphorus, the sample was illuminated by a pulse of light from an infrared monochromator. the EPR spectra were recorded at different intervals after turning off the light. The time dependence of the neutral phosphorus atoms was determined by measuring the amplitudes of the lines. The results have shown that the equilibrium is not established exponentially,

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ACC NR: AP6037024

owing to the uneven distribution of the impurity atoms. The rate of inter-impurity
recombination depends strongly on the impurity concentration and increases with de-
creasing temperature. The time during which the excess concentration of neutral
atoms of phosphorus decreases by a factor e is found to be $\tau = \tau_0 \exp(\Delta E / kT)$, where
$\Delta E = 5 \times 10^{-4}$ ev and $\tau_0 = 8$ sec (T = temperature, k = Boltzmann's constant). It is
noted that ΔE is of the same order of magnitude as the activation energy correspond-
ing to the temperature dependence of the impurity conductivity of copper atoms in
germanium and phosphorus and boron atoms in silicon. Consequently, measurement of
ΔE over a wide temperature interval and measurement of the activation energy in the
same samples would permit a more thorough study of inter-impurity recombination.
Orig. art. has: 2 figures.

SUB CODE: 20/   SUBM DATE: 18Jun66/   ORIG REF: 003/   OTH REF: 006

Card 2/2

GERASEVA, L.A.; VAVILOV, V.V.

Moderation of neutrons in iron - water mixtures. Atom.energ. 8
no.6:556-557 Je '60.   (MIRA 13:6)
(Neutrons)

a

KAMAYEV, A.V.; DUBOVSKIY, B.G.; VAVILOV, V.V.; POPOV, G.A.;
    PALAMARCHUK, Yu.D.; IVANOV, S.P.

[Experimental study of the effects of interaction of two
subcritical reactors] Eksperimental'noe izuchenie ef-
fektov vzaimodeistviia dvukh podkriticheskikh reaktorov.
Moskva, Glav. upr. po ispol'zovaniiu atomnoi energii,
1960. 10 p.   (MIRA 17:1)

ALEKSANDROV, B.F., inzh.; BALYKOV, V.M., inzh.; BARANOVSKIY, F.I., inzh.;
BOGUTSKIY, N.V., inzh.; BUN'KO, V.A., kand.tekhn.nauk, dotsent;
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dotsent; KUSNITSYN, G.I., inzh.; LATYSHEV, A.F., inzh.; LEYBOV,
R.M., doktor tekhn.nauk, prof.; LEYTES, Z.M., inzh.; LISITSYN, A.A.,
inzh.; LOKHANIN, K.A., inzh.; LYUBIMOV, B.N., inzh.; MASHKEVICH,
K.S., inzh.; MALKHAS'YAN, R.V.; MILOSERDIN, M.M., inzh.; MITNIK,
V.B., kand.tekhn.nauk; MIKHEYEV, Yu.A., inzh.; PARAMONOV, V.I.,
inzh.; ROMANOVSKIY, Yu.G., inzh.; RUBINOVICH, Ye.Ye., inzh.;
SAMOYLYUK, N.D., kand.tekhn.nauk; SMEKHOV, V.K., inzh.; SMOLDY-
REV, A.Ye., kand.tekhn.nauk; SNAGIN, V.T., inzh.; SNAGOVSKIY,
Ye.S., kand.tekhn.nauk; FEYGIN, L.M., inzh.; FRENKEL', B.B., inzh.;
FURMAN, A.A., inzh.; KHORIN, V.N., dotsent, kand.tekhn.nauk; CHET-
VERKOV, B.M., inzh.; CHUGUNIKHIN, S.I., inzh.; SHELKOVNIKOV, V.N.,
inzh.; SHIRYAYEV, B.M., inzh.; SHISHKIN, N.F., kand.tekhn.nauk;
SHPIL'BERG, I.L., inzh.; SHORIN, V.G., dotsent, kand.tekhn.nauk;
SHTOKMAN, I.G., doktor tekhn.nauk; SHURIS, N.A., inzh.; TERPIGOREV,
A.M., glavnyy red.; TOPCHIYEV, A.V., otv.red.toma; LIVSHITS, I.I.,
zamestitel' otv.red.; ABRAMOV, V.I., red.; LADYGIN, A.M., red.;
MOROZOV, R.N., red.; OZERNOY, M.I., red.; SPIVAKOVSKIY, A.O.,
red.; FAYBISOVICH, I.L., red.; ARKHANGEL'SKIY, A.S., inzh., red.;
(Continued on next card)

ALEKSANDROV, B.F.---(continued)   Card 2.
    BELYAYEV, V.S., inzh., red.; BUKHANOVA, L.I., inzh., red.; VLASOV,
    V.M., inzh., red.; GLADILIN, L.V., prof., doktor tekhn.nauk, red.;
    GREBTSOV, N.V., inzh., red.; GRECHISHKIN, F.G., inzh., red.; GON-
    CHAREVICH, I.F., kand.tekhn.nauk, red.; GUDALOV, V.P., kand.tekhn.
    nauk, red.; IGNATOV, N.N., inzh., red.; LOMAKIN, S.M., dotsent, kand.
    tekhn.nauk, red.; MARTYNOV, M.V., dotsent, kand.tekhn.nauk, red.;
    POVOLOTSKIY, I.A., inzh., red.; SVETLICHNYY, P.L., inzh., red.;SAL'-
    TSEVICH, L.A., kand.tekhn.nauk, red.; SPERANTOV, A.V., kand.tekhn.
    nauk, red.; SHETLER, G.A., inzh., red.; ABARBARCHUK, F.I., red.izd-va;
    PROZOROVSKAYA, V.L., tekhn.red.; KONDRAT'YEVA, M.A., tekhn.red.

    [Mining; an encyclopedic handbook] Gornoe delo; entsiklopedicheskii
    spravochnik. Glav.red.A.M.Terpigorev. Chleny glav.redaktsii A.I.
    Baranov i dr. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po gornomu delu.
    Vol.7. [Mining machinery] Gornye mashiny. Redkol.toma A.V.Topchiev i
    dr. 1959. 638 p.   (Mining machinery)   (MIRA 13:1)

VAVILOV, V.V.

21(4)   PHASE I BOOK EXPLOITATION   SOV/2583

International Conference on the Peaceful Uses of Atomic Energy. 2nd, Geneva, 1958.

Doklady sovetskikh uchenykh; yadernye reaktory i yadernaya ener-
getika. (Reports of Soviet Scientists; Nuclear Reactors and
Nuclear Power) Moscow, Atomizdat, 1959. 707 p. (Series: Its
Trudy, vol. 2) Errata slip inserted. 8,000 copies printed.

General Ed.: M.A. Dollezhal, Corresponding Member, USSR Academy of
Sciences, A.K. Krasin, Doctor of Physical and Mathematical Sciences,
A.I. Leypunskiy, Member, Ukrainian SSR Academy of Sciences, I.I.
Novikov, Corresponding Member, USSR Academy of Sciences, and V.S.
Fursov, Doctor of Physical and Mathematical Sciences; Ed.: Ye.I. Mazel',
Tech. Ed.: Ye. I. Mazel'.

PURPOSE: This book is intended for scientists and engineers engaged
in reactor designing, as well as for professors and students of
higher technical schools where reactor design is taught.

COVERAGE: This is the second volume of a six-volume collection on the peaceful
use of atomic energy. The six volumes contain the reports pre-
sented by Soviet scientists at the Second International Conference
on Peaceful Uses of Atomic Energy, held from September 1 to 13,
1958 in Geneva. Volume 2 consists of three parts. The first is
devoted to atomic power plants under construction in the Soviet
Union; the second to experimental and research reactors, the ex-
periments carried out on them, and the work to improve them; and
the third, which is predominantly theoretical, to problems of
nuclear reactor physics and construction engineering. Yu. I.
Koryakin is the science editor of this volume. See SOV/2581
for titles of all volumes of the set. References appear at the
end of the articles.

Mostovoy, V.I., V.S. Dikarev, M.B. Yegiazarov, and Yu. S. Saltykov.
Measuring Neutron Spectra in Uranium Water Lattices (Report
No. 2152)   546

Erozin, A.I., B.G. Dubovskiy, M.M. Lantsov, Yu.Yu. Glazkov,
B.K. Gochurov, A.V. Kamayev, L.A. Gerasev, Z.V. Vavilov,
Ye. I. Inyutin, and A.P. Senchenkov. Studying the Physical
Characteristics of a Beryllium-moderator Reactor (Report No.
2146)   555

Galanin, A.D., S.A. Mostovaya, A.P. Rudik, Yu. G. Abov, V.P.
Beldin, and P.A. Krupchitskiy. Critical Experiment on an Experi-
mental Heavy-water Reactor (Report No. 2036)   570

Marchuk, G.I., V. Ya. Pupko, Ye. I. Pogudalina, V.V. Smelov,
I.P. Tuterev, B.I. Platonova, and G.I. Druzhinina. Certain Pro-
blems in Nuclear Reactor Physics and Methods of Calculating
Them (Report No. 2151)   588

Sluyutin, G.V. and V.M. Semanov. Determination of Control Rod
Effectiveness in a Cylindrical Reactor (Report No. 2469)   613

Gelfand, I.M., S.M. Fernberg, A.S. Frolov, and N.N. Chentsov.
Using the Monte Carlo Method of Random Sampling for Solving the
Kinetic Equation (Report No. 2141)   628

Laletin, N.I. Neutron Distribution in a Heterogeneous Medium
(Report No. 1439)   634

Kazarnovskiy, M.V., A.V. Stepanov, and F.L. Shapiro. Neutron
Thermalization and Diffusion in Heavy Media (Report No. 2148)   651

Voynik, A.I., V.S. Yermakov, and A.V. Lykov. Using the Onsager
Theory for Studying Neutron Diffusion in the Absorbing Media of
Nuclear Reactors (Report No. 2224)   668

Broder, D.L., S.A. Kurdin, A.A. Kutuzov, V.V. Levin, and
V.V. Orlov. Studying the Spatial and Energy Distribution of
Neutrons in Different Media (Report No. 2147)   674

Dmitriyev, A.B. Boron Ionization Chambers for Work in Nuclear
Reactors (Report No. 2084)   690

Kirillin, V.A., and S.A. Ulybin. Experimental Determination of
Specific Volumes of Heavy Water in a Wide Temperature and Pres-
sure Range (Report No. 2471)   69

PHASE I BOOK EXPLOITATION   SOV/5337

Parasenkov, Ye. I., ed.

Issledovaniya kriticheskikh parametrov reaktornykh sistem; sbornik statey (Study of Critical Parameters of Reactor Systems; Collection of Articles) Moscow, Gosatomizdat, 1960. 117 p. Errata slip inserted. 5,600 copies printed.

Tech. Ed.: N.A. Vlasova.

PURPOSE: This collection of articles is intended for nuclear physicists and engineers of nuclear power plants.

COVERAGE: The book contains previously unpublished original articles concerned with the theoretical calculation of neutron fluxs and of critical parameters (critical masses and volumes) of various reactor systems: uranium-graphite, uranium-beryllium, and water mixtures of uranium and plutonium. Individual articles present tables and graphs used in the determination of the dependence of critical parameters on the relative concentration and the character of the fissionable material and the moderator, as well as on fuel enrichment for a wide range of neutron energy spectra. The following are mentioned: P.A. Gavrilo (scientific editor of the collection), and B.I. Sokolov, L.N. Spakhova,

A. Ya. Ryumina, R.P. Roschina and V.S. Vladimirov (compilers of Table 1, table of values of coefficients k, D and Y). References accompany individual articles

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AVAILABLE: Library of Congress

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JA/bva/mas
7-25-61

S/089/60/008/06, 11, 02:
B006/B063   82312

21.1700

AUTHORS: Geraseva, L. A., Vavilov, V. V.

TITLE: Neutron Moderation in Iron - Water Assemblies

PERIODICAL: Atomnaya energiya, 1960, Vol. 8, No. 6, pp. 556-557

TEXT: The investigations described in the present article were carried
out in a steel tank (74x74x100 cm) containing water and CT-3 (St-3)
plates (71.5 x 71.5 x 0.3 cm). A bakelite coating protected the tank
and the plates against corrosion. The plates were arranged perpendicularly
to the direction in which the distribution of the moderation density was
measured, and were kept in this position by Duralumin and Plexiglas
holders which were fixed at the bottom and walls of the tank.
Measurements were made for three different specific volume concentrations
of the iron in the assembly: ρ = 0.14, 0.26, and 0.43; ρ = iron volume/
(iron volume plus water volume). The fission neutrons were obtained from
a converter that converted the thermal neutrons of the reactor into such
corresponding to the spectrum of U^{235} fission. It was made of uranoso-

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Neutron Moderation in Iron - Water Assemblies   S/089/60/008/06/11/021
B006/B063 82312

uranic oxide enriched in U^{235} to 75%. The spatial distribution of the
moderated neutrons was measured by means of indium foils. Due to the
relatively small flux of thermal neutrons (and, accordingly, due to
the small flux of fast neutrons from the converter), the measurements
could be made only at a distance of less than 56 cm from the source.
The results obtained are, however, extrapolated according to the
well-known law that describes the drop of moderation density with
rising distance from the source: $\sim(ke^{-r/\lambda})/r^2$, where λ denotes the

relaxation length. The neutron age was calculated from the formula

$\tau = \frac{1}{6}\left[\int_0^\infty Ar^4 dr / \int_0^\infty Ar^2 dr\right]$, and the following values were obtained:

$\tau_{H_2O} = 30.2\pm1.5$ cm^2, $\tau_{Fe+H_2O} = 31.0\pm2.7$ cm^2 for $\rho = 0.14$;

$\tau_{Fe+H_2O} = 39.7\pm2.0$ cm^2 for $\rho = 0.26$; $\tau_{Fe+H_2O} = 50.4\pm2.5$ cm^2 for $\rho = 0.43$.

A general formula is given for the determination of the neutron age in

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an assembly where the moderation length of each component is known. The
accompanying Fig. shows τ as a function of ρ (both experimental and
calculated values: τ_{Fe} = 743 cm^2, τ_{H_2O} = 30.5 cm^2). The agreement was
found to be good. Finally, the authors thank B. G. Dubovskiy and Yu. A.
Sergeyev for having suggested this work and for their discussion, as
well as V. K. Labuzov, Yu. S. Ziryukin, M. M. Kuzichkina, and A. T.
Anfilatov for their participation in the measurements. There are 1
figure and 2 references: 1 Soviet and 1 US.

SUBMITTED: January 7, 1960

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VAVILOV, V.V.   *4*

S/661/61/000/006/019/081
D205/D302

AUTHORS: Tarasova, A. S., Petrov, A. D., Andrianov, K. A., Go-
            lubtsov, S. A., Ponomarenko, V. A., Cherkayev, V. G.,
            Zadorozhnyy, N. A. and Vavilov, V. V.

TITLE: Continuous addition of hydrochlorosilanes to unsatura-
            ted compounds

SOURCE: Khimiya i prakticheskoye primeneniye kremneorganiches-
            kikh soyedineniye; trudy konferentsii, no. 6, Doklady,
            diskussii resheniye. II Vses. Konfer. po khimii i prakt.
            prim. kremneorg. Soyed., Len. 1958. Leningrad, Izd-vo
            AN SSSR. 1961, 99-100

TEXT: For practical application of the addition reactions of me-
thyl dichlorosilane, ethyl dichlorosilane and trichlorosilane to
liquid and gaseous unsaturated compounds an apparatus was designed
and optimum conditions of synthesis were established. The chloro-
silane and the gas are fed into a reactor. The products are dis-
charged via a cooler into a receiver equipped with a reflux. Dur-

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Continuous addition of ...

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ing the reaction the reactor and cooler are cooled by water, the receiver and the reflux by brine. The arrangement was tested on the reaction of ethylene with methyl dichlorosilane and ethyl dichlorosilane. The experiments have shown that in the 35 - 200°C temperature range the reaction is unchanged giving a 65 - 75% yield. No by-products are formed and the output is high ($>$ 6 kg of methyl ethyl dichlorosilane/hr/l of reactor volume). The process is amenable to automation owing to its insensitivity to temperature changes. There are 1 figure and 1 table.

Card 2/2

DUBOVSKIY, B.G.; KAMAYEV, A.V.; VLADYKOV, G.M.; KUZNETSOV, F.M.; NOZIK, V.Z.;
    PALAMARCHUK, Yu.D.; POPOV, G.A.; VAVILOV, V.V.

    Interaction in subcritical reactors. Atom. energ. 16 no.1:16-20 Ja
    '64.   (MIRA 17:2)

ACC NR: AM6032824   (A)   Monograph   UR/

Dubovskiy, B. G.; Kamayev, A. V.; Kuznetsov, F. M.; Vladykov, G. M.; Gurin, V. N.;
   Murashov, A. P.; Markelov, I. P.; Kochergin, V. P.; Vaymugin, A. A.; Sviridenko,
   V. Ya.; Dlyev, L.V.; Bogatyrev, V.K.; Yaviloy, Y. V.; Frolov, V. V.

Critical parameters of systems with fissionable materials and nuclear safety; a
   handbook (Kriticheskiye parametry sistem s delyashchimisya veshchestvami i
   yadernaya bezopasnost'; spravochnik) Moscow. Atomizdat. 1966. 225 p. biblio. ,
   diagrs., tables. 9000 copies printed.

TOPIC TAGS: nuclear safety, nuclear reactor, homogeneous nuclear reactor,
   heterogeneous nuclear reactor, chain reaction

PURPOSE AND COVERAGE: This handbook is intended for specialists concerned with
   the problems of assuring nuclear safety as well as for persons calculating, de-
   signing, operating, and studying the physics of nuclear reactors of various types,
   as well as for students in associated departments. The book discusses methods of
   creating and maintaining conditions which will exclude the possibility of an
   accidentally chain reaction during the processing, storage, and transportation of
   fissionable materials. The book is based mainly on the results of studies pub-
   lished before 1965. In addition to information on critical parameters of systems
   with fissionable materials, the authors considered it useful to include in the
   handbook the fundamental concepts of criticality, principles for assuring nuclear
   safety, a review of cases of the occurrence of uncontrolled chain reactions,

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ACC NR: AM6052824

and the basic standards for nuclear safety. The authors express appreciation to M. P. Rodionov, T. I. Sukhoverkhova, M. A.Gavrilova, and L. V. Antonkina for their valuable assistance. There are 64 references, 30 of which are Soviet.

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PARAMONOV, V.I., inzh.; KOLBASIN, G.M., inzh.; VAVILOV, V.V., inzh.

Unit of equipment with the M-9 support. Mekh.trud.rab. 11
no.8:17-21 Ag '57.   (MIRA 10:11)
            (Coal mines and mining--Equipment and supplies)

PETROV, A.D.; ANDRIANOV, K.A.; GOLUBTSOV, S.A.; PONOMARENKO, V.A.;
CHERKAYEV, V.G.; TARASOVA, A.S.; VAVILOV, V.V.; ZADOROZHNYY, N.A.;
POPELEVA, G.S.

Continuous method of catalytic addition of hydrosilanes to un-
saturated compounds. Khim.nauk i prom. 3 no.5:679-681 '58.

1. Institut organicheskoy khimii im. V.D. Zelinskogo.
      (Silane)   (Unsaturated compounds)

VAVILOV, Vyacheslav Viktorovich; ORLOV, Anatoliy Aleksandrovich;
BARANOVSKIY, P.I., otv. red.; SHKLYAR, S.Ya., tekhn. red.
MAKSIMOVA, V.V., tekhn. red.

[KM-9 and KM-9 coal-mining units] Ugledobyvaiushchie kom-
pleksy KM-9 i KM-9D. Moskva, Gosgortekhizdat, 1963. 111 p.
                                              (MIRA 16:9)
          (Coal mining machinery)

L 33245-65   EWT(m)/EPF(c)/EPF(n)-2/EWG(m)/EPR   Pr-4/Ps-4/Pu-4   DM

ACCESSION NR: AP4012260   S/0089/64/016/001/0016/0020

AUTHOR: Dubovskiy, B. G.; Kamayev, A. V.; Vladyykov, G. M.; Kuznetsov, F. M.; Nozik, V. Z.; Palamarchuk, Yu. D.; Popov, G. A.; Vavilov, V. V.

TITLE: Interaction of subcritical reactors

SOURCE: Atomnaya energiya, v. 16, no. 1, 1964, 16-20

TOPIC TAGS: subcritical reactor interaction, reactor safety estimation, fissionable material, equivalent reactor dimension , reactor dimension computation

ABSTRACT: The purpose of the present work is to obtain a method for a reliable safety estimation of interacting systems containing fissionable materials. This estimation is used to provide a safety margin for producing, storing, and transporting fissionable materials. The method of equivalent size has been developed by the authors. This method, in essence, is based on the assumption that a set of subcritical assemblies with specific nuclear properties and geometric parameters can be replaced by a nuclear reactor with equivalent geometrical buckling

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and the former nuclear characteristics. The device for studying the interaction
of subcritical assembly in a three dimensional lattice is shown in Fig. 1(Enclosure).
The results of the computation are found to be in good agreement with experiment-
al results, having in all cases a safety margin. "The authors are grateful to
V. G. Zagrafov for valuable comments." Orig. art. has: 6 figures and 1 table.

ASSOCIATION: None

SUBMITTED: 17Nov62   ENCL: 001

SUB CODE: NP   NR REF SOV:002   OTHER: 00%

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End
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